

PROCEEDINGS  
OF THE  
BIOLOGICAL SOCIETY OF WASHINGTON

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SOME OBSERVATIONS MADE ON LITTLE RIVER, NEAR  
WICHITA, KANSAS, WITH REFERENCE  
TO THE UNIONIDE.\*

BY H. WALTON CLARK AND GEORGE H. GILLETTE.

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U. S. Commissioner of Fisheries.]

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Little Arkansas River, more commonly known locally as Little River, is one of the largest northern tributaries of the Arkansas River in Kansas. It rises in the great wheat fields of central Kansas and takes a winding southeasterly course, emptying its waters into the Arkansas River at Wichita. The country through which it flows is wholly an agricultural region, broad fields of corn occupying the bottom land lying next to the stream on each side, while on the higher land farther away lie extensive wheat fields. Little River, in marked contrast with the usual type of western stream, keeps up a steady flow throughout the year, and is not materially affected by the dry season of July, August and September. This would seem to indicate that the stream is fed by numerous springs or underground flow. The upper course was not examined, but in the lower course the well-water of the bottom lands is reached at a depth of from 15 to 20 feet, which is about the depth of the banks of the stream. The water is unusually uniform in temperature, being cooler in summer than other streams of the vicinity, and abnormally warm in winter, so that it is rarely ever frozen over very thickly even in the coldest weather, and in some portions it has never been known to freeze entirely over. These circumstances also tend to indicate that the river owes its steady flow

\* The field investigations on which this paper is based were made by the junior author in August, 1910.

in a considerable measure to many springs, or that its bed lies about on the level of the underground flow.

The water is moderately clear, excepting after heavy rains, when it has a dark gray appearance. This is in marked contrast to the waters of the Arkansas River proper, the waters of which are light ashly in color at normal stage. The banks of Little River are lined with trees and underbrush. Among the trees are found cottonwood, willow, birch, walnut and elm, the trees and underbrush extending back from a few to several rods. The banks on one side are rugged and steep, while on the other they are low and in some places boggy,—the high and low side depending on the curvature of the stream; on the convex side of the curve will be found the high bank, and on the opposite or concave side is the low and boggy portion.

Observations were made from near the mouth of the river to about 10 miles upstream, near Valley Center. About two miles above Wichita a dam, known as Sullivan's dam, has been built, for the purpose of dividing the flow of the river, causing a portion of the flow to run through the eastern part of the city. It is said that this dam was built for two purposes: (1) to protect the city from overflow and (2) to furnish means of flushing a small stagnant creek, Chisholm Creek, which flows through the eastern part of the city, and into which the refuse of manufacturing plants, packing houses, etc., is dumped.

This dam is built principally of cement, is 4 to 6 feet high and from 50 to 75 feet long. As it has no fishway, the only means by which fish below the dam could get up above would be by passing down stream into the Big Arkansas and then up Chisholm Creek, and finally pass through this artificial ditch or cut-off to the waters above the dam. At the head of the ditch near the dam is a floodgate, also built of cement. When the water in the river is running high this gate is kept closed, so as not to let too much water into Chisholm Creek; during low water, however, the gate is always kept open.

Above the dam the river is considerably deeper than below; it has a much slower current, and spreads out to a breadth of from 75 to 100 feet. Most of the collecting was done above the dam. This was very difficult because the bottom was full of broken logs, rubbish, etc. The bottom consists mostly of muck and coarse gravel, with very little shifting sand, the

gravel being in nearly every case in the center of the stream, and the black muck along the shores and in all the eddies.

About 100 shells were collected. While the shells were not especially abundant, excellent examples of some of the good commercial species are present; among them the heelsplitter (*Symphymota complanata*), buckhorn or pistolgrip (*Tritogonia tuberculata*), yellow sandshell (*Lampsilis anodontoïdes*) and mapleleaf (*Quadrula lachrymosa*).

Many of the specimens, especially of the lighter-shelled species such as the floater (*Anodonta grandis*) and heelsplitter, were obtained in the eddies and protected places in the stream where there was very little current. The heavier-shelled species, such as the buckhorn, yellow sandshell and mapleleaf were found both in the eddies and protected places, and in some instances in the swiftly running stream, but no shells of any kind were found where there was any shifting sand. A favorite place for the heavy-shelled varieties was the lower edges of the sand or gravel bars, while on the tops of these bars where the water was swifter, none was found. We were unable to determine to what extent they were found in similar situations in the deepest water, as we had no tongs or grappling hooks.

So far as we could learn no mussels were being taken from the river for commercial purposes, although we heard of a party who had obtained quite a valuable collection of pearls from mussels taken in the river. In many of the specimens taken, small poorly developed pearls were found, but not of sufficient size and quality to be of much value.

Observations were also made on the Big Arkansas above Wichita on August 26. The river at this point is wide and shallow, the water at this time covering only about one-fourth of the bed. The main channel of the stream did not follow the center of the bed, but crossed diagonally from one side to the other. The current was swift and carried with it a large amount of shifting white sand which gave the water a yellowish creamy appearance. About 3 miles were covered during these observations. Owing to so much shifting fine sand and the changing of the main channel of the river during high water, it is impossible for mollusks requiring the support of a permanent bottom to exist in this river at the place of observation. In this three-mile course only one valve of a mussel shell was found and this

was picked up in a rubbish pile. It was bleached and very brittle, and gave evidence of having been carried a long distance. It had no doubt been washed into the river from one of its tributaries.

## LIST OF SPECIES.

1. *Quadrula pustulosa* (Lea).

## WARTYBACK.

There are 15 examples of this species, 12 from near Wichita and 3 from Valley Center. These are all rather small or medium-sized shells and quite uniform in character, being markedly compressed and unusually smooth, most of them being entirely free from elevations and the most pustulous one containing a few very low, hardly perceptible nodules near the ventral border. The whole collection presented a considerable difference from *Q. pustulosa* as usually seen, and it was only after some consideration and comparison that they were identified as this species. They represent the form originally described as a distinct species under the name *Unio schoolcraftii*. This flat, smooth form is of occasional occurrence in collections, and examples are now and then found mixed in with beds of the more common inflated pustulous form. This is our first experience in finding it the predominant form. The existence of this and intergrading forms, along with other aberrant and peculiar types, has long made *Q. pustulosa* a puzzling species. The history of the study of this species would be merely an account of the various attempts to assemble a motley but well-connected series of forms, and authorities differ somewhat as to the number of forms to include. Baker\* speaks of having before him at one time 19 different varieties of *Q. pustulosa* from a number of States, and Call† discusses its variability and synonymy at considerable length, and says: "From the Little Arkansas, at Wichita, Kansas, come numbers of magnificent examples of *schoolcraftii*, some entirely covered with pustules, others absolutely devoid of even a semblance of one; indeed the writer's collection contains some fifty examples from that stream, exhibiting every phase of nodulation from absolutely smooth specimens to those showing great numbers of small pustules. The characters of the cardinal teeth alone would have sufficed, in the hands of species mongers, to make a dozen extremely characteristic species."

In view of this statement it is rather remarkable that all our specimens should be so uniform. These smooth flattened shells are even superior to the inflated pustulous forms for commercial purposes. All our specimens, however, are of rather small size.

2. *Quadrula lachrymosa* (Lea).

## MAPLELEAF.

Of this species there are 22 from near Wichita in the collection and 10 from near Valley Center. They are all of large size and very uniform in general appearance.

\* Mollusca of the Chicago Area; Bull. Ill. part 1, Nat. Hist. Survey, Chicago Acad.

† The Unionide of Arkansas; Trans. Acad. Sci. St. Louis, Vol. VII, No. 1, p. 43.

Compared with the species as generally known, these shells exhibit the same departures from the general type as those exhibited by the *Q. pustulosa* just mentioned; that is, they are unusually compressed, and noteworthy for the fewness and smallness of pustules which are frequently altogether absent on the posterior ridge. The sulcus is also unusually shallow. The shells, however, average larger than in ordinary collections. The nacre is white and clear, and free from stains.

*Q. lachrymosa* is a very fair commercial species, and the specimens from the Little Arkansas are considerably superior to the ordinary type on account of the flatness and smoothness of the shell.

### 3. *Symphynota complanata* (Barnes).

#### HEELSPLITTER.

Fifteen examples of this species were obtained, 12 from near Wichita, and 3 from Valley Center.

The heelsplitter dwells in a variety of situations such as ponds, sloughs and the more quiet portion of rivers. It varies considerably in minor details such as thickness of shell, development of wing, etc., but is generally pretty uniform in general shape. Bayou-dwelling examples are usually roughened, thin-shelled and badly stained, so that they have no commercial value. In some places (the upper Mississippi) the shells are peculiarly truncate posteriorly, as if they had abruptly stopped growing in that part of the shell.

We have had no opportunity to study the bodies of *S. complanata* from Little River. Generally speaking the species is, like the *Anodontas*, quite markedly subject to the attack of parasites, leeches being occasional, *Atax* frequent and *Aspidogaster conchicola* abundant. River-dwelling mussels are usually not so badly affected as those living in sloughs, and from these perfectly formed and excellent shells it would appear that parasites are not especially abundant here.

*Symphynota complanata* is usually too thin, and sometimes too badly stained to be of any value in the manufacture of buttons so that it is not generally regarded as a commercial species. On account of its flatness and broad expanse of shell, when it develops a sufficient thickness of shell it is an excellent button species. No other native freshwater shell except the immense thick *Quadrula heros* and the beautiful but valueless *Anodonta suborbiculata* equals it in surface, and where it can be used more buttons can be cut from a ton of shells of this species than from any other freshwater mussel.

The specimens from the Little Arkansas are exceptionally fine. We have seen none to approach them in excellence except a few examples much like them collected in Perche Creek, Missouri, by Doctors Lefevre and Curtis, of the University of Missouri. Some of the shells, both from Perche Creek and Wichita, are unusually elongate, and all are remarkably smooth and heavy. The nacre is of a clear soft satiny texture, pearly white in all but 2 examples, in which it is a very faint warm yellowish pink, too faint to be more than a mere suggestion of color and very

attractive to the eye. Although they lack the iridescence of the best niggerhead material the soft satiny luster is scarcely less attractive, and these shells would make excellent button material.

Just within the naere of one of the shells are numerous fine whitish, long, crooked tracks, each ending in a small elevation which shows dark beneath. The dark point proves, on examination, to be a larval *Atax* which has been coated over with naere. The peculiar tendency of young *Atax* to bore entirely through the mantle, crawling along on the naere and finally becoming covered over with a nacreous deposit, was first noticed during the past summer (1910) by the senior author in *S. complanata* from the sloughs near Fairport, Iowa. So far, we have observed it in no other species of mussel. It seems improbable that the larvæ could ever work their way out again after being thus entombed. They appear to have no other effect upon the naere than to leave the whitish tracks ending in the low raised point already described, and both of these marks are probably soon covered up and concealed by a new growth of shell.

#### 4. *Anodonta grandis* Say.

FLOATER.

Fifteen examples, all from near Wichita. These are all mature shells of fairly large size, of the *oratus* type. None of the shells shows the salmon-colored and diseased naere usually frequent where parasitic trematodes are common. There are a few pearl-like blisters in some, but as a rule they are free from abnormalities. No. 41 is rather thick and No. 42 has pink naere. The species has no commercial value.

#### 5. *Tritogonia tuberculata* (Barnes).

BUCKHORN; PISTOLGRIP.

Three rather large shells, all from near Wichita. All are moderately elongate and have white naere. They are of good commercial quality.

#### 6. *Lampsilis anodontoides* (Lea).

YELLOW SANDSHELL.

One medium-sized example from near Wichita. This shell is considerably deformed and twisted, and the greater part of the epidermis is stained and unusually imbricate. Where it reaches good development, this is the most valuable of the freshwater shells.